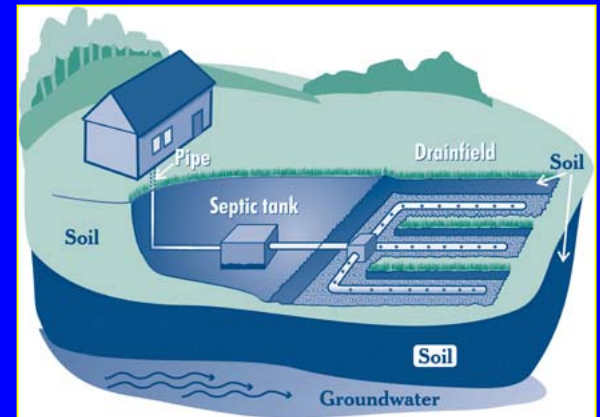
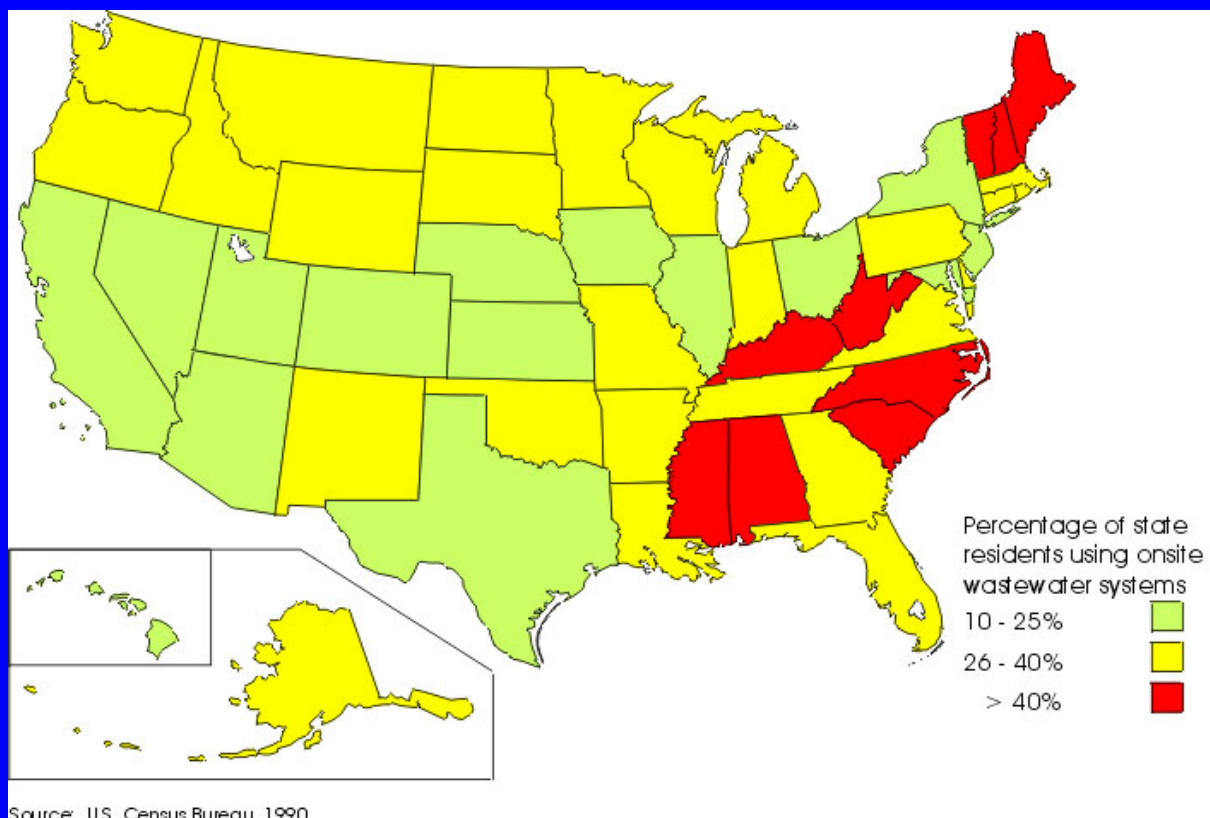


Onsite Septic Systems

A National, State, and Local Perspective



Percentage of State Residents Using Septic Systems



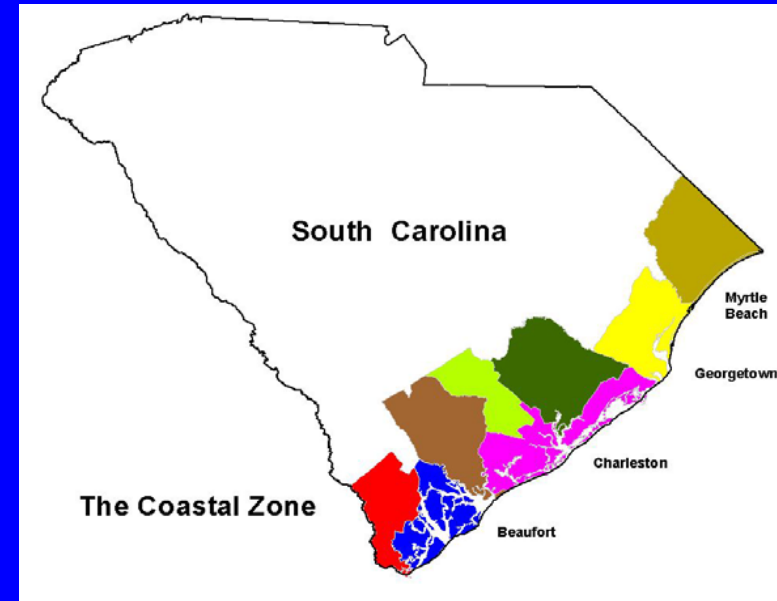
Water Quality Problems on a National Scale

- 10-30% of systems failing annually
- At least 10% of systems >30 yrs. old



SC Coastal Living

- 8-county coastal zone covers 23% of state's total land area
- 981,000 residents *plus* 17 million visitors annually
- 500,000 more residents in coastal zone in 20 years
- By 2010, one-third of state's population will live in coastal zone



Septic Systems in Coastal Zone FY 01

- **Acceptable sites:**
21,500 statewide
3,800 (18%) in CZ
- **Alternative systems:**
26% statewide
76% coast wide
(shallow, ultra shallow)
- **Denial rate:**
3% statewide
6% average coast wide

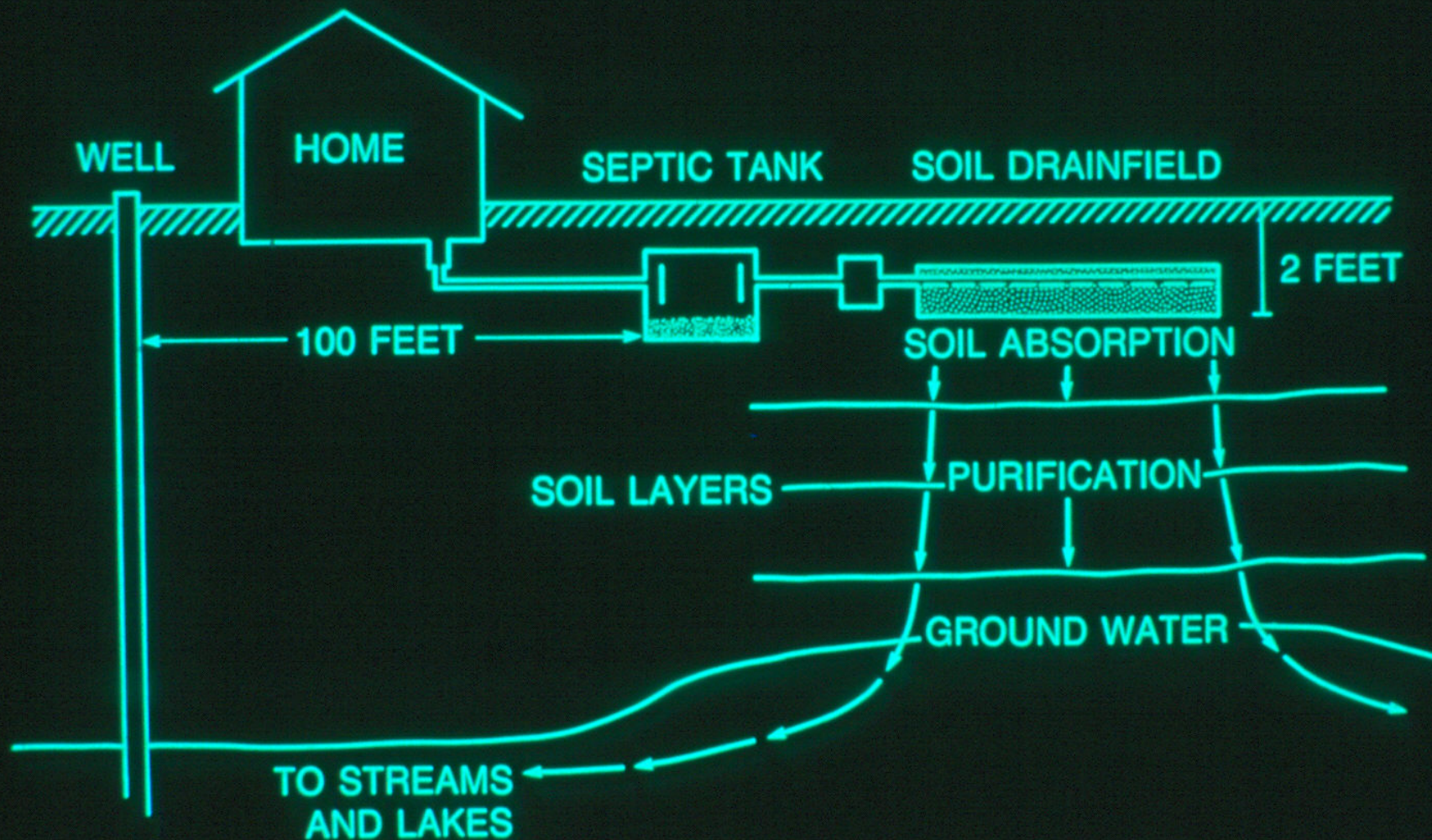


What's the Problem?

- State regulations need updating
 - Some say weakest in nation
- Development pressure high
- No maintenance or inspection requirements
- Education inadequate:
 - Service industry
 - Public

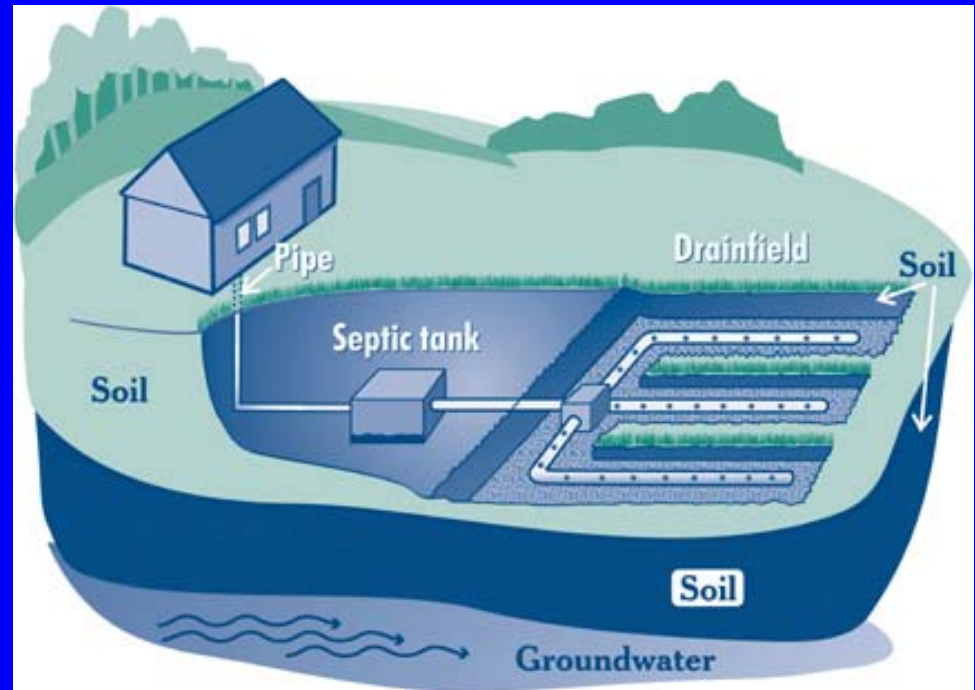
Overview of Basics

- **Septic systems**
 - System components
 - Treatment processes
- **Operation & Maintenance**
- **What OCRM is doing**



Septic Systems - 3 Parts

- Septic tank
- Distribution box
- Drainfield



Septic Tank

- Concrete
- Watertight



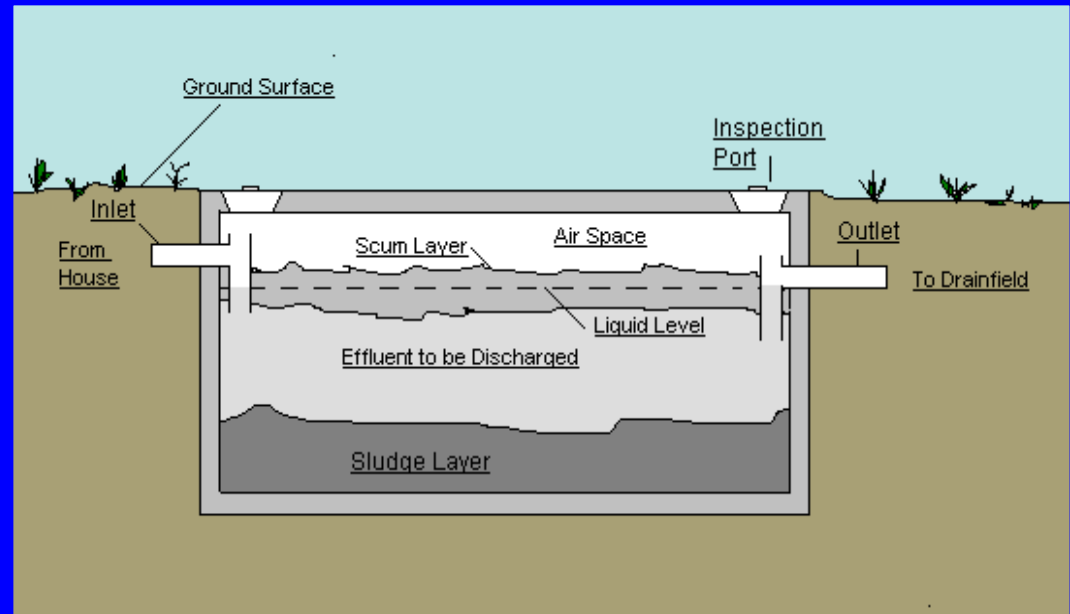
Septic Tank Hall of Fame

- 55 Gallon barrels
- Steel drums 300 - 900 Gal
- Reinforced concrete pipe
- Cast iron pipe
- Brick
- Old Buicks



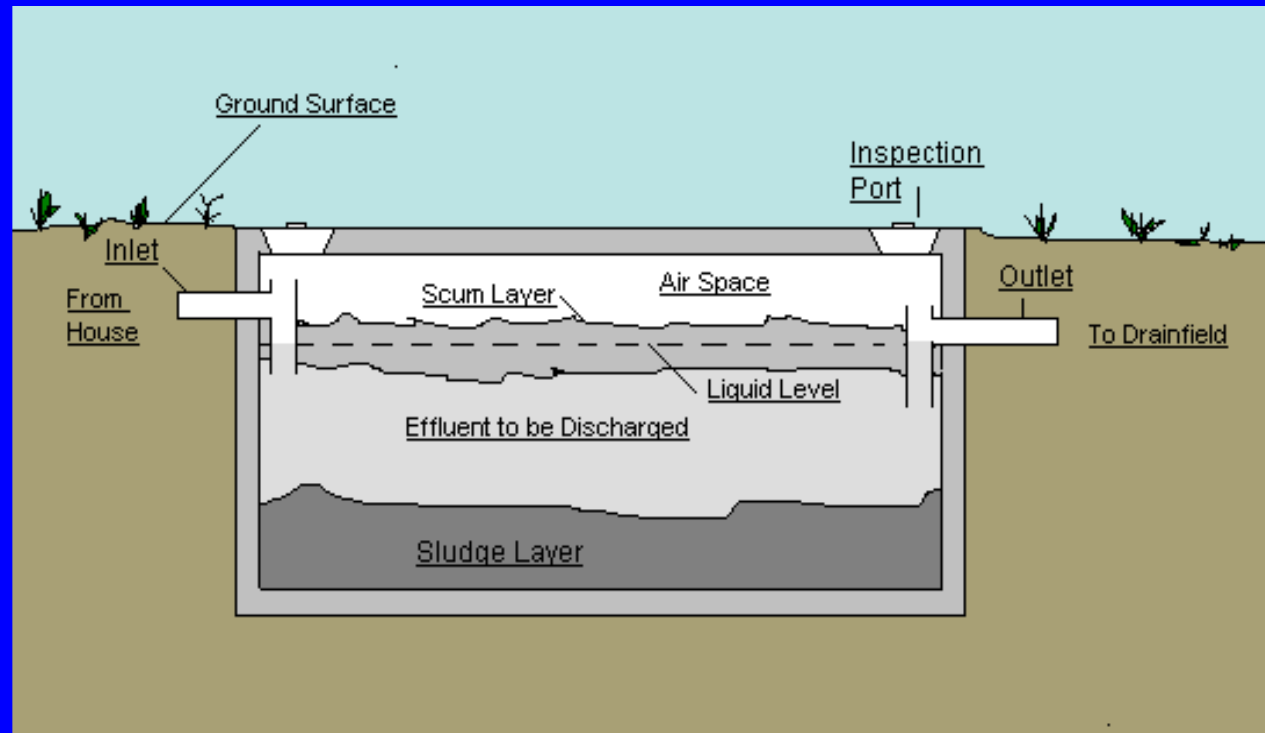
Septic Tank Functions

- Hydraulic retention
- Primary treatment
- Anaerobic digestion



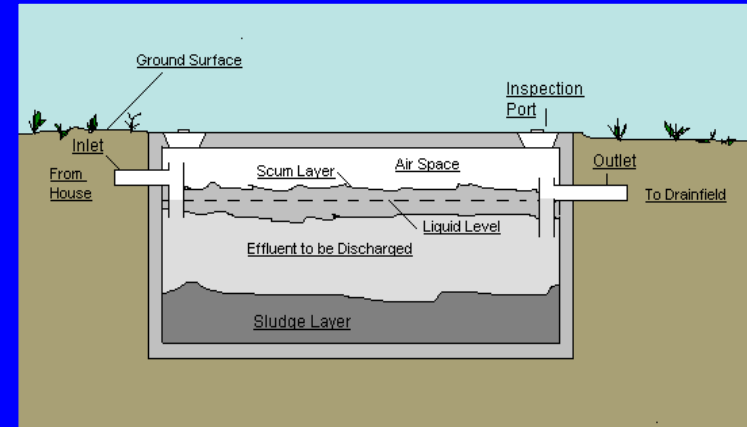
Three Layers or Zones

- Scum layer
- Clarified or clear zone
- Sludge layer



Inlet / Outlet Tees

- **Inlet**
 - Reduces agitation
 - Reduces short circuiting
- **Outlet**
 - Bottom in clarified zone
 - Scum and sludge out of drainfield



Broken tees are problematic!

Broken tee



Top part of intact tee



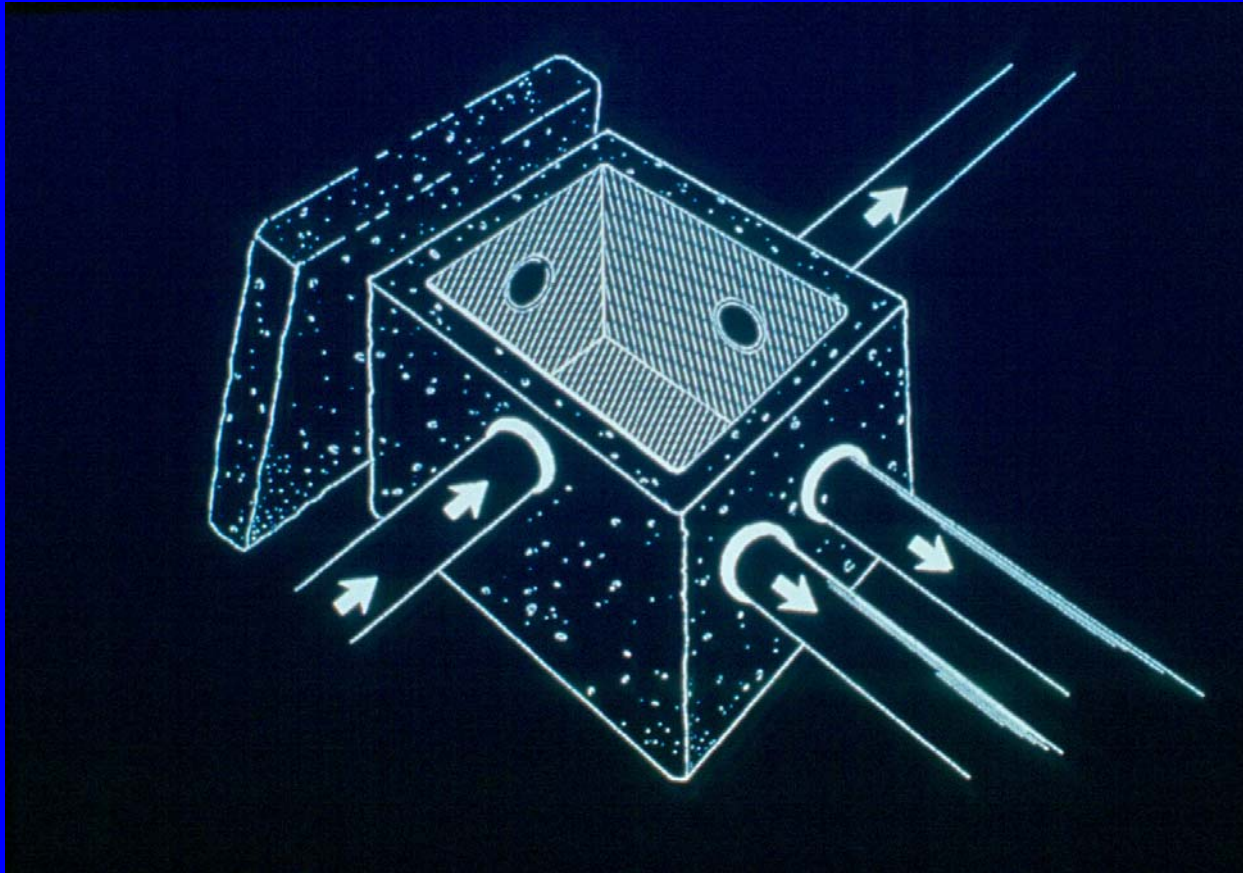
New tank & D-box

Distribution
box

Concrete baffle
acts as a tee



Distribution Boxes



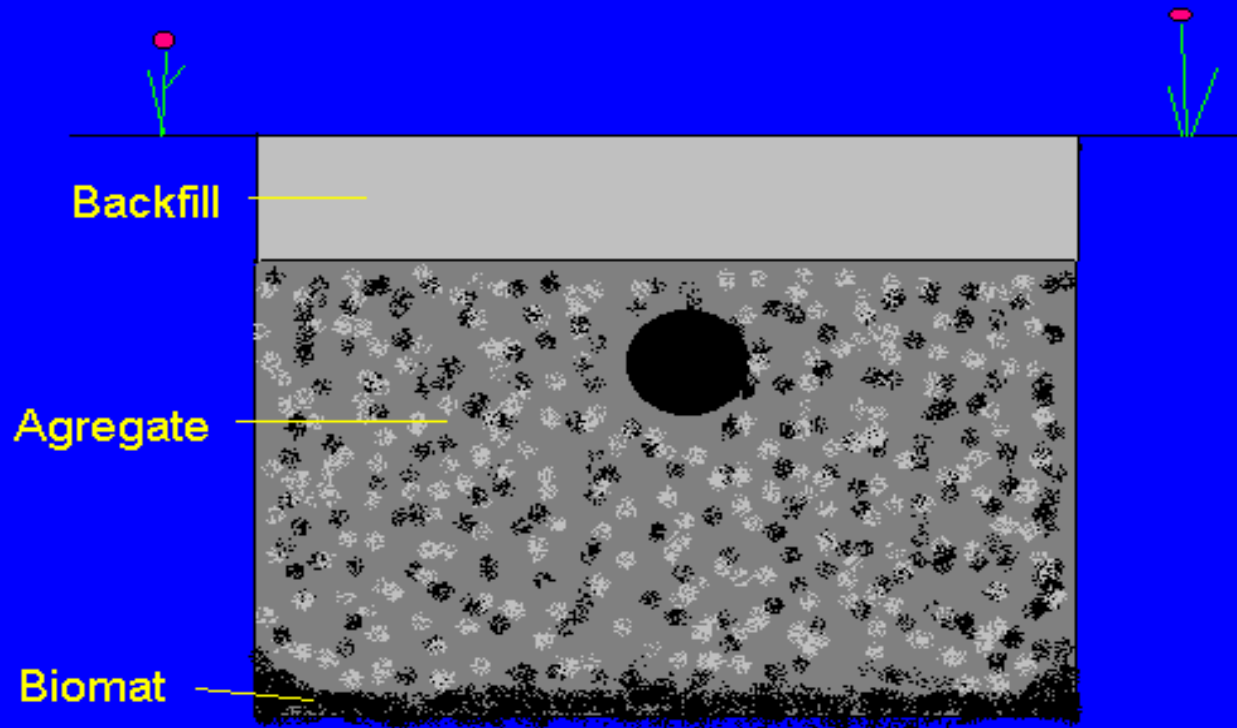
Drainfields



Types of Drainfields

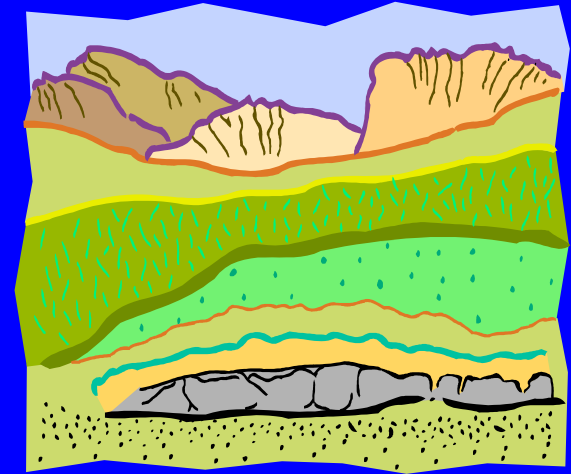
- **Conventional**
 - Deeper in ground
 - Most common statewide
- **Alternative**
 - Shallow placement
 - Most common on coast
- **Innovative/experimental**
 - Mostly used for repairs or special cases
 - Higher maintenance requirements

Drainfield Trench Cross Section



Controlling Factors in Soil Treatment of Wastewater

- Physical
- Chemical
- Biological
- Environmental
- Wastewater characteristics



Soil Texture

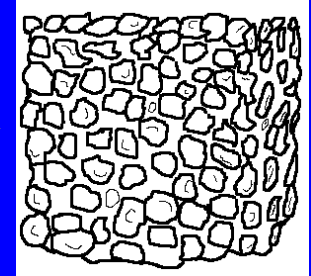
- Proportion of sand, silt and clay
- Strongly influences
 - Infiltration and permeability
 - Biomat formation
 - Effluent treatment
 - System construction

Treatment Efficiency – soil structure

- Single grained (poor)



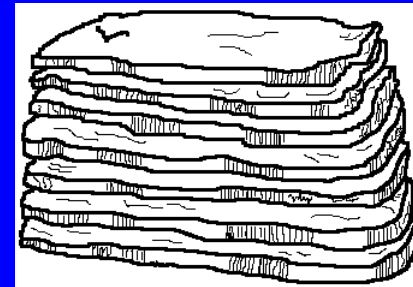
- Granular (moderate)



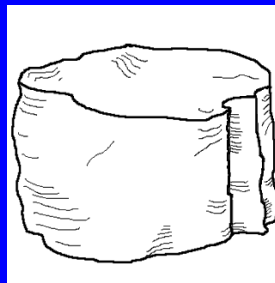
- Blocky (good)



- Platy (poor)

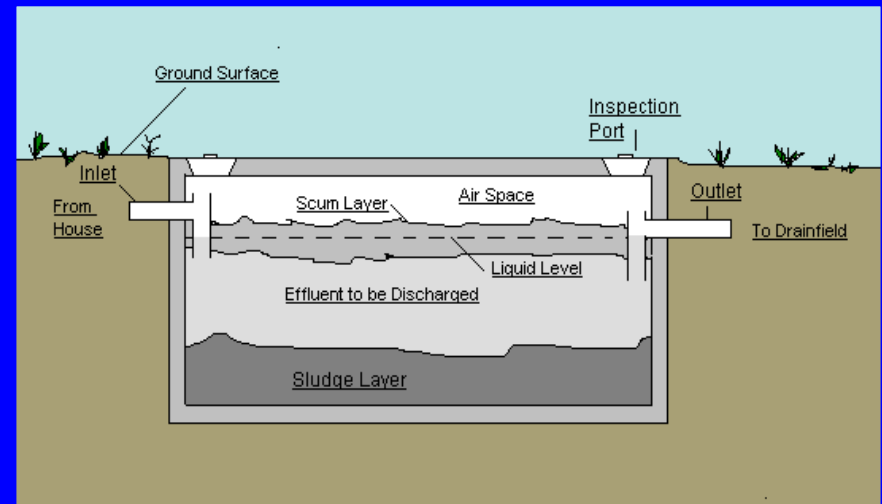


- Massive (none)



Pollutants Common in Septic Tank Effluent

- Total suspended solids (TSS)
- Biochemical oxygen demand (BOD)
- Nutrients
- Pathogens
- Fats, oils, grease (FOG)



Pollutants Common in Septic Tank Effluent

- Toxic organics – solvents, cleaners
- Heavy metals – cadmium, zinc, nickel, copper
- Dissolved inorganics – chloride, sulfate, sodium

Nitrogen



- Effluent contains organic and ammonium nitrogen
- Converted to nitrate nitrogen
- Biological denitrification
- Under wet conditions ammonium is unchanged

Pathogens

- Disease-causing organisms
 - Direct contact by humans
 - Consumption of contaminated shellfish
- Bacteria – fecal coliform indicator (range 100,000 – 1 million per 100 ml)
- Protozoa - cryptosporidium
- Helminthes – septic worms
- Viruses – live longer, travel farther



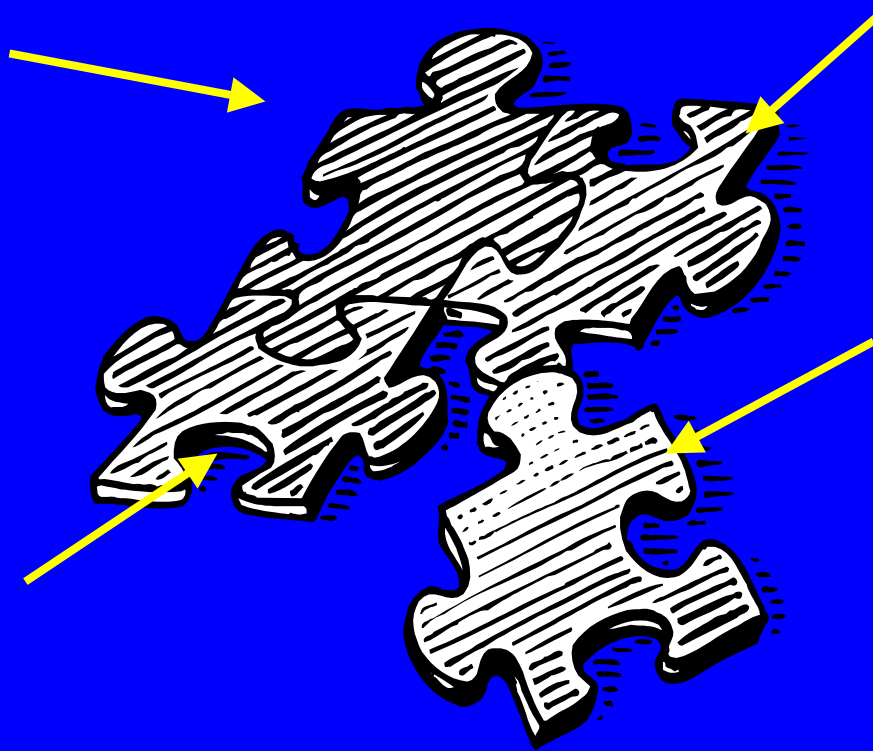
Septic Systems Work Great With...

Proper
Siting

Proper
Installation

Proper
Design

Proper
Operation &
Maintenance
(O&M)



Folly Beach Pilot Inspection & Maintenance Program

- 40 OSDS inspected
- Old & new
- Good & bad
- Manufactured & homemade
- Non-DHEC inspectors trained
- Systems replaced



Folly Beach – Ideal Setting

- Sensitive environment
- Dependence on septic systems
- Variety of residences
- Ages & types of systems
- Willingness to participate



Folly Beach Inspection Project Results

- Conducted in 1999
- 40 systems in study
- 18% - failing
- 35% - minor repairs
- 44% - good condition
- 3% - not accessible
- Failing systems had few obvious signs of failure



Reasons for Failure:

- ✘ Installed on poor soils or soils with high water table (older systems permitted under old “perc” method)
- ✘ System is undersized for number of occupants
- ✘ Site alterations after permitted
- ✘ Not properly constructed
- ✘ Not properly cared for

Reasons for Failure:

- ✘ Broken tees

- ✘ Solids in drain lines and soil

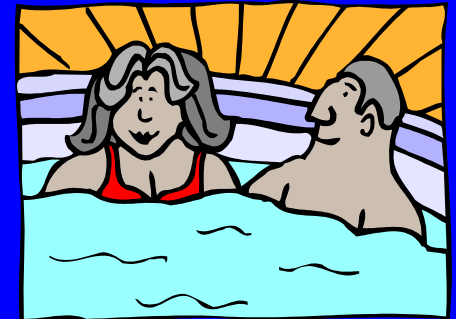
- ✘ Cracked tank

- ✘ Saturated system



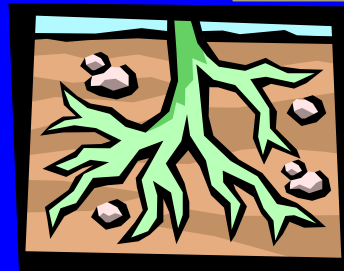
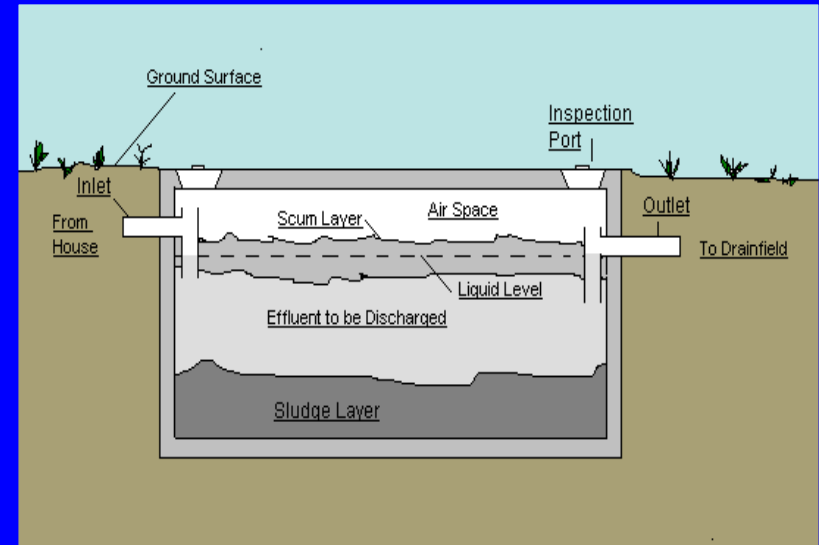
Proper Operation & Maintenance

- Responsibility of homeowner
- Know what can & can't go down drain
- Don't overload system
- Don't drive over system



Proper Operation & Maintenance

- Prevent problems before they happen
- Pump out solids from tank every 3-5 years
- Protect drainfield from damage
 - roots
 - excess water
 - excess solids



Maintenance is not...

putting additives
in the system to
take the place of
pumping.

Additives can
harm the system
AND waste
people's money!



O&M Do's & Don'ts

DO:

- Conserve water
- Repair leaky plumbing
- Divert surface water from system
- Have tank inspected & pumped regularly

DON'T

- Use additives
- Use garbage disp.
- Drive or park over system
- Plant trees nearby
- Pave or build over
- Dispose of certain items...

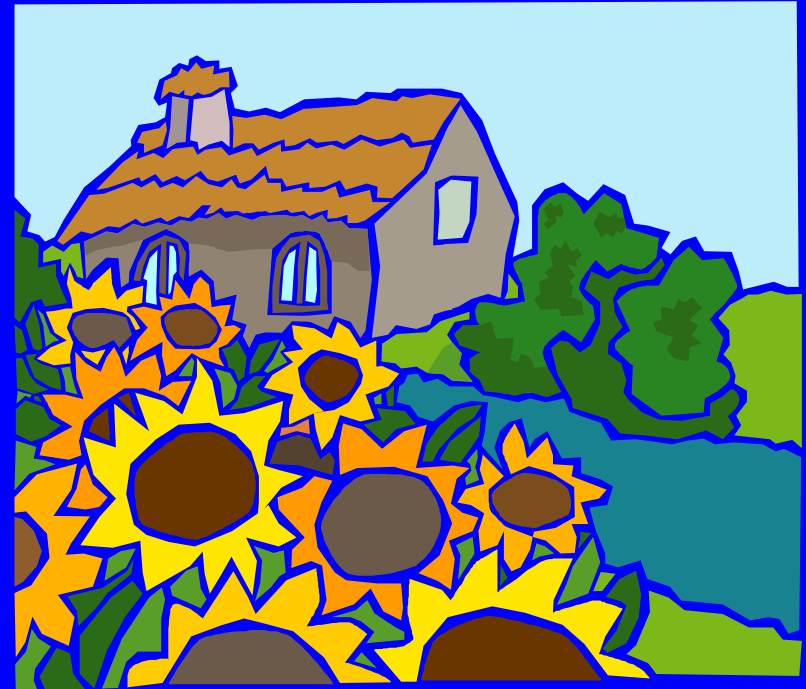
DO NOT FLUSH...

- Additives
- Cigarette butts
- Coffee grinds
- Condoms
- Dental floss
- Disposable diapers
- Fats, oils, grease
- Kitty litter
- Paints, thinners, varnish
- Paper towels
- Photographic solutions
- Sanitary napkins
- Tampons / applicators
- Waste oils or pesticides



Prevent Failure

- Know system location
- Keep records of repairs & maintenance
- Educate users on proper operation & maintenance



Proper Operation & Maintenance Can:

- Save thousands in costly repairs
- Reduce impacts to health and environment
- Keep septic systems working for a long time



OCRM Efforts Include:

- *Fact sheets and folder*
- *Folly Beach pilot inspection project*
- *Inspector training pilot program*
- *Assisting Folly Beach and Edisto Beach on management program*
 - *Data management consultant*
 - *Model ordinance*
- *Public outreach*